



NAVAL AIR ENGINEERING CENTER

PHILADELPHIA, PENNSYLVANIA 19112

IN REPLY REFER TO:
M-412-ERW:1bg
10330
(8417)

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION			
Hardcopy	Microfiche		
\$1.00	\$.50	5 ^s	PPAS
/ ARCHIVE COPY			

26 SEP 1966

From: Commanding Officer, Naval Air Engineering Center, Phila., Pa. 19112
To: Commander, Naval Air Systems Command (AIR 520331)

Subj: Assignment 65-49 Analytical Methods in Specifications; Optimization
of - Report No. NAEC AML 2488 Analysis of Metallic Matte, Origin
Unknown

Ref: (a) Private communication with H. W. Gilbert STIC, U. S. Navy, of
11 July 1966

Encl: (1) Plate 1 - Physical Appearance of Sample

1. Under the authorization of the subject assignment, a sample of material, apparently metallic, was submitted by Dr. H. W. Gilbert of the Scientific and Technical Intelligence Center, U. S. Navy for identification and possible clues regarding its origin. In addition to the verbal report of the results obtained, it was subsequently requested by reference (a) that a written report be submitted.

2. The physical appearance of the sample as received was similar to a metallic sulfide matte and had a brass-like color. Plate 1 is a photo micrograph of a cross-section of the material in which stratifications are clearly defined. Alternate layers appear to be more metallic than the others.

3. The sample was further tested as follows:

(a) The specific gravity of the sample was determined and was found to be 4.76.

(b) The metallic composition was determined spectrographically to be:

Major elements - Nickel, Cobalt

Trace elements - Iron, Manganese, Chromium, Silicon, Aluminum, Copper, Zinc

The density of the spectrographic lines indicated the nickel to cobalt ratio to be in the order of three to one.

OCT 24 1966

Distribution of this document is unlimited

A

M-412-ERW:1bg
10330
(8417)

(c) Qualitative chemical analysis established sulfide as the major anion.

(d) Electron diffraction studies were made in an attempt to establish the origin of the material. Although the impurities present offered some interference to the electron diffraction patterns, evidence for presence of the following was obtained:

<u>Likelihood of Presence</u>	
NiS (Millerite)	Very good
NiS (Bunsenite)	Very good
CuS ₂ (Cattierite)	Good
CuNiO ₂ (Cobalt-Nickel-Oxide)	Good
NiCo ₃ (Nickel Carbonate)	Good

4. Based on the spectrographic analysis, the electron diffraction studies, and the comparison of the specific gravity with that of materials reported in the literature, it is considered that the sample probably originated from a refining or smelting process for cobalt and nickel.

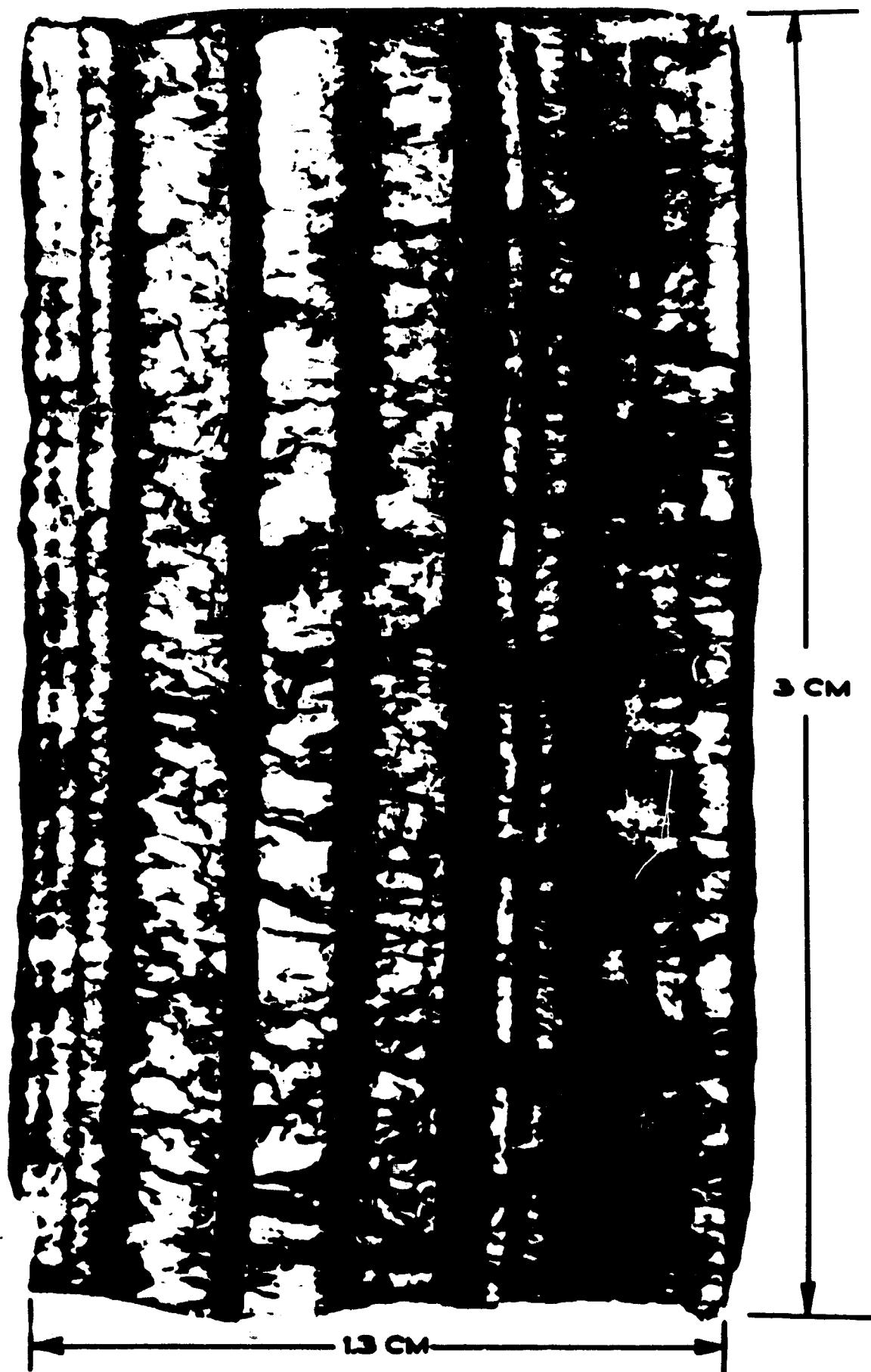
5. This is a partial report under the subject assignment which is being held open for additional investigations of a similar nature.

F. S. Williams
F. S. WILLIAMS
By direction

Copy to:

Naval Air Stations
BWFRRCEN
NAFI
AFSC Liaison Officer,
NADC, Johnsville, Pa.
NAVAIRSYSCOM (AIR 4142P)

REPORT NO. NAEC-AML-2488



PHYSICAL APPEARANCE OF SAMPLE

PHOTO NO: CAN-376725(L)-7-66

PLATE 1

Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) ✓ Naval Air Engineering Center Aeronautical Materials Laboratory Philadelphia, Pa. 19112		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE Analysis of Metallic Matte, Origin Unknown		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Partial report		
5. AUTHOR(S) (Last name, first name, initial) Wright, E. R.		
6. REPORT DATE September 1966	7a. TOTAL NO. OF PAGES 2	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Report No. NAEC AML 2488	
b. PROJECT NO. c. Assignment 65-49	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. AVAILABILITY/LIMITATION NOTICES Distribution of this document is unlimited		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Naval Air Systems Command Department of the Navy Washington, D. C. 20360	
13. ABSTRACT A sample of material, submitted by Dr. H. W. Gilbert of the Scientific and Technical Intelligence Center, U. S. Navy, was examined for identification and possible clues regarding its origin. Based on the spectrographic analysis, the electron diffraction studies, and the comparison of the specific gravity with that of materials reported in the literature, it is considered that the sample probably originated from a refining or smelting process for cobalt and nickel.		

Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Metallic Sulfide						

INSTRUCTIONS

1. ORIGINATING ACTIVITY: Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (corporate author) issuing the report.

2a. REPORT SECURITY CLASSIFICATION: Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2b. GROUP: Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. REPORT TITLE: Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. DESCRIPTIVE NOTES: If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. AUTHOR(S): Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. REPORT DATE: Enter the date of the report as day, month, year, or month, year. If more than one date appears on the report, use date of publication.

7a. TOTAL NUMBER OF PAGES: The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7b. NUMBER OF REFERENCES: Enter the total number of references cited in the report.

8a. CONTRACT OR GRANT NUMBER: If appropriate, enter the applicable number of the contract or grant under which the report was written.

8b, 8c, & 8d. PROJECT NUMBER: Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9a. ORIGINATOR'S REPORT NUMBER(S): Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9b. OTHER REPORT NUMBER(S): If the report has been assigned any other report numbers (either by the originator or by the sponsor), also enter this number(s).

10. AVAILABILITY/LIMITATION NOTICE: Enter any limitations on further dissemination of the report, other than those

imposed by security classification, using standard statements such as:

- (1) "Qualified requesters may obtain copies of this report from DDC."
- (2) "Foreign announcement and dissemination of this report by DDC is not authorized."
- (3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through"
- (4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through"
- (5) "All distribution of this report is controlled. Qualified DDC users shall request through"

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. SUPPLEMENTARY NOTES: Use for additional explanatory notes.

12. SPONSORING MILITARY ACTIVITY: Enter the name of the departmental project office or laboratory sponsoring (paying for) the research and development. Include address.

13. ABSTRACT: Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (T3), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. KEY WORDS: Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, roles, and weights is optional.